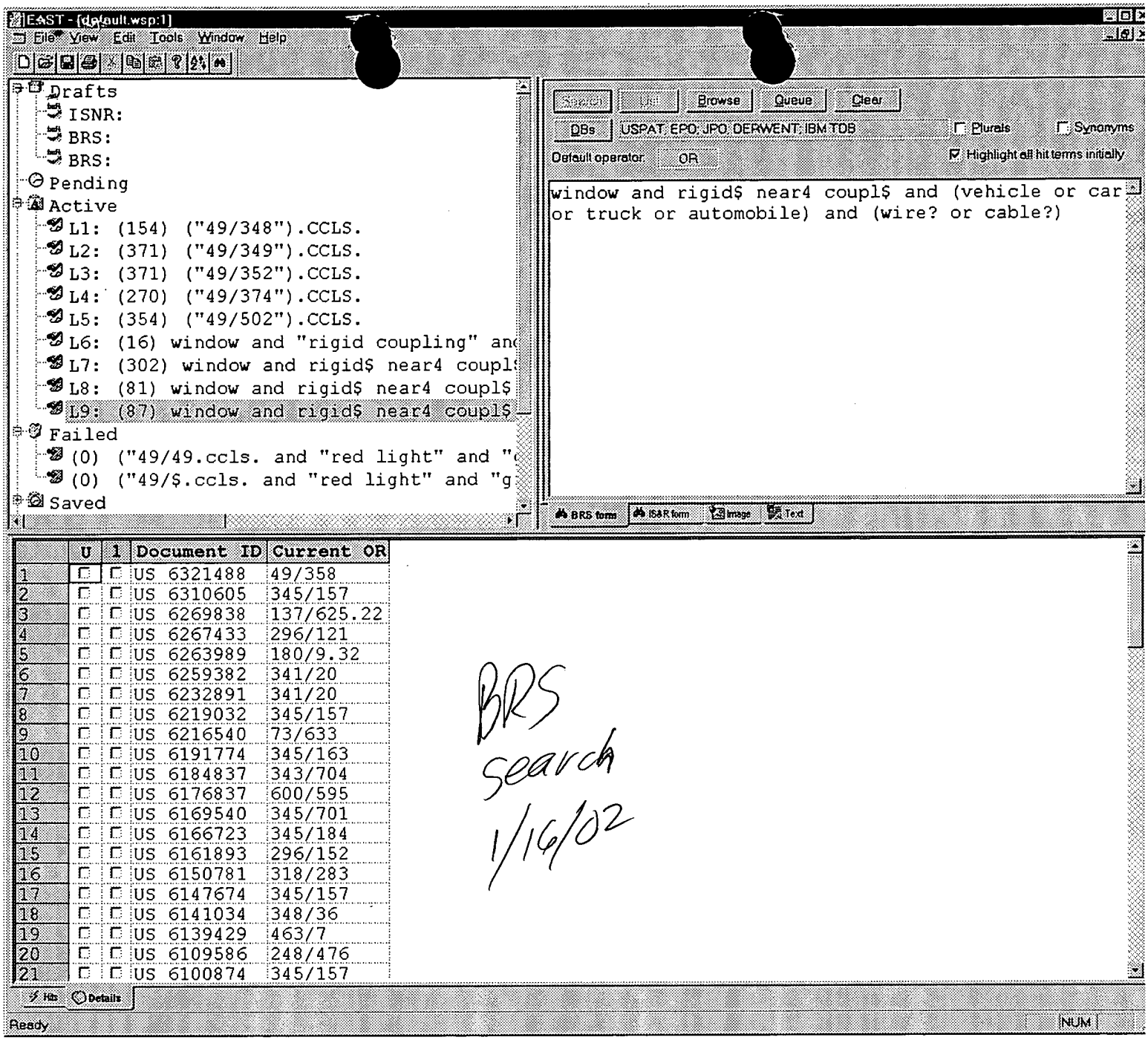

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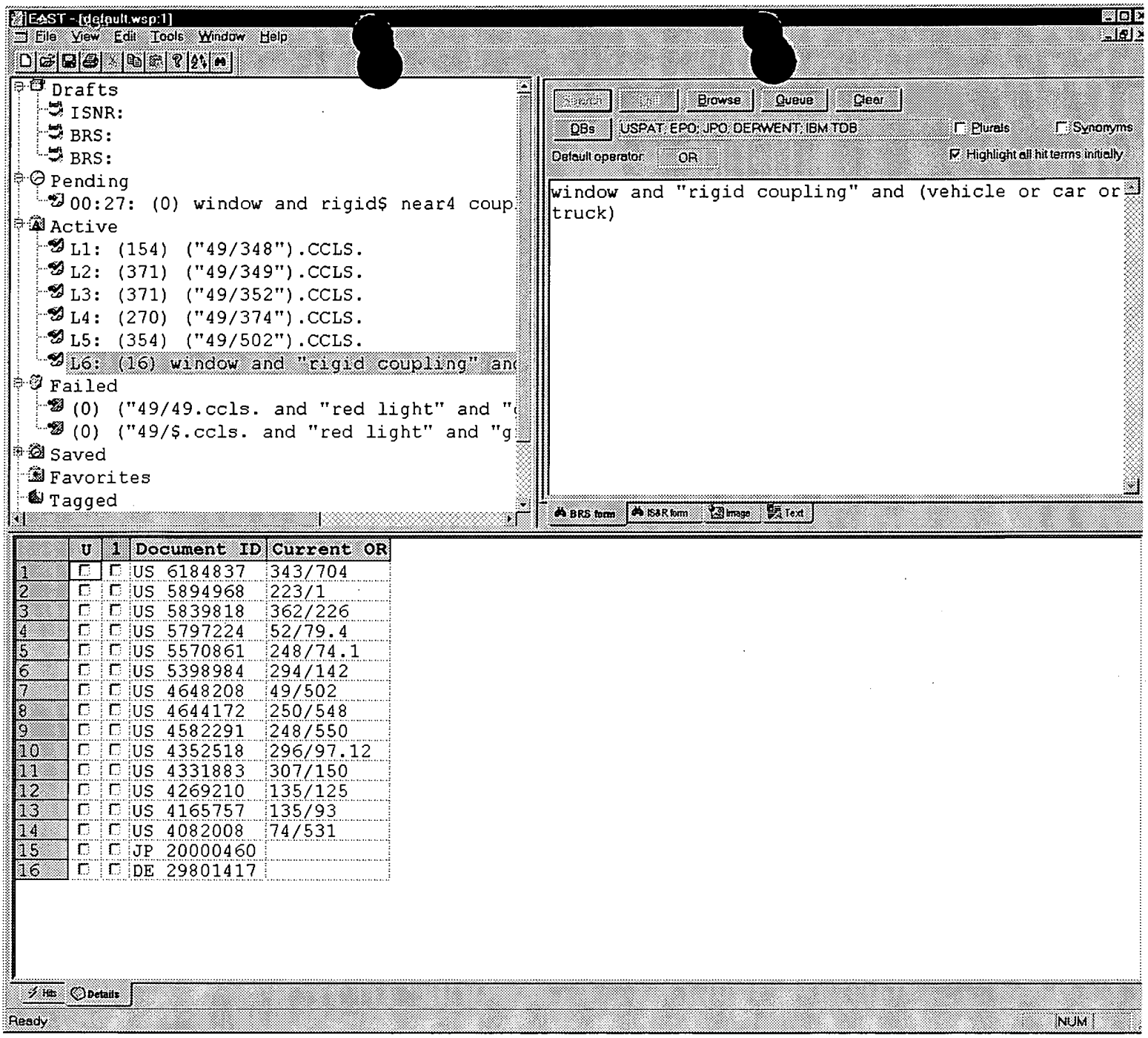

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United States Patent [19]

TenBrink et al.

[11] Patent Number: 5,469,663

[45] Date of Patent: N v. 28, 1995

[54] **SNAP-IN ATTACHMENT OF WINDOW PANE LIFT PLATE TO WINDOW REGULATOR**

[75] Inventors: **Jay T. TenBrink**, Goodrich; **Maryanne R. Farkas**, Bloomfield Hills, both of Mich.

[73] Assignee: **Chrysler Corporation**, Highland Park, Mich.

[21] Appl. No.: **334,095**

[22] Filed: **Nov. 4, 1994**

[51] **Int. Cl.**[6] **E05F 11/38**

[52] **U.S. Cl.** **49/375**; 49/349; 49/352

[58] **Field of Search** 49/375, 374, 352, 49/349, 351, 352, 348

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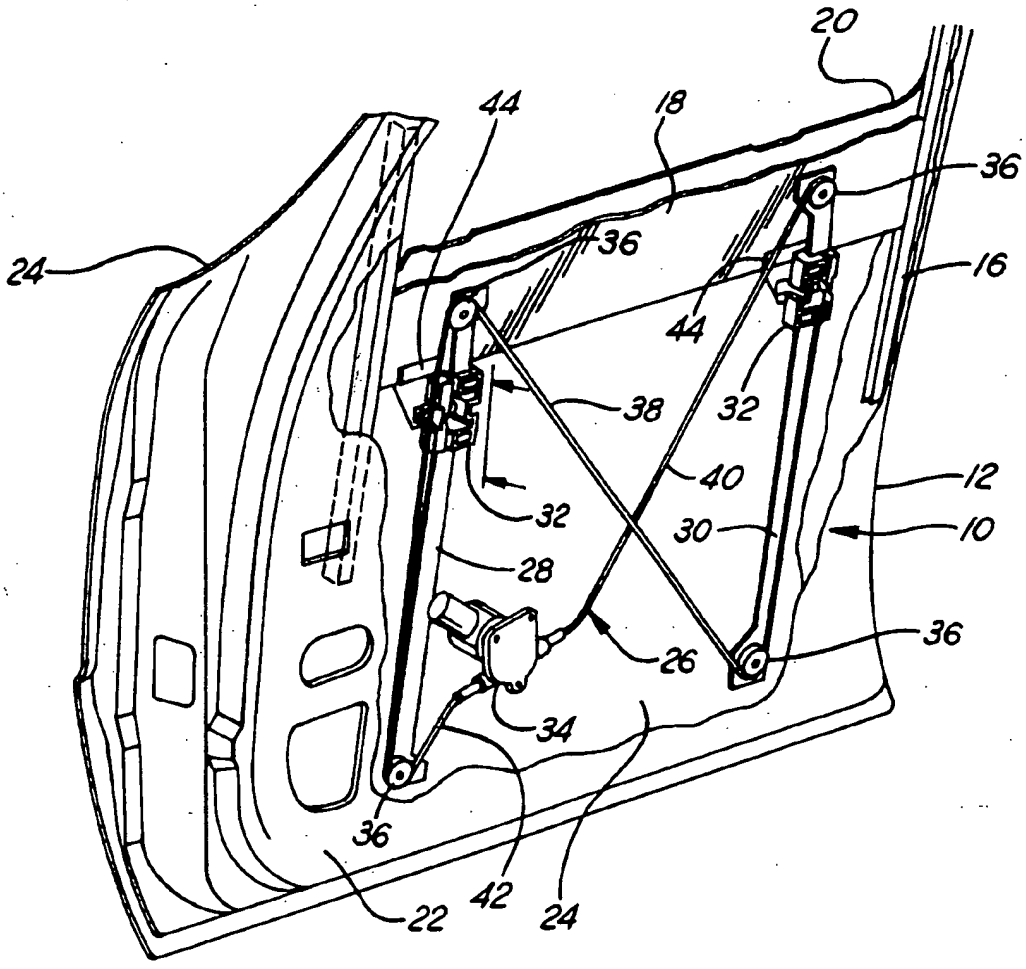
Primary Examiner—Philip C. Kannan

Attorney, Agent, or Firm—Margaret A. Dobrowitsky

[57] **ABSTRACT**

A glider block assembly for a window regulator in a motor vehicle structure includes a glider block and a spring clip adapted to receive a pin with an engaging head extending from a window lift plate. The glider block has an opening sized to receive the pin and a guide pin slot intersecting the opening. The spring clip is disposed in the spring clip slot and provides an entry gap smaller than the engaging head. The clip extends in part across the opening to provide an entry gap smaller than the engaging head. The spring clip expands to allow the engaging head to pass therethrough in response to pressure of the head thereagainst when the pin is received by the block and snaps back behind the head, thereby retaining the plate to the block.

12 Claims, 1 Drawing Sheet



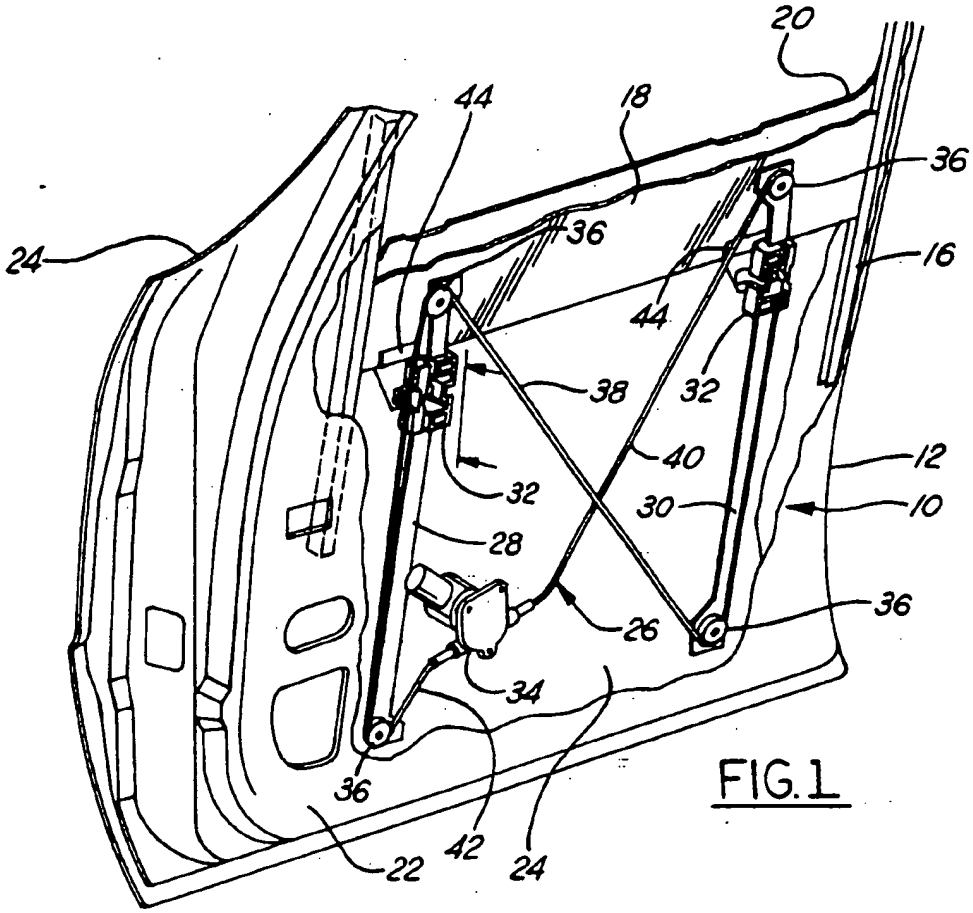


FIG. 1

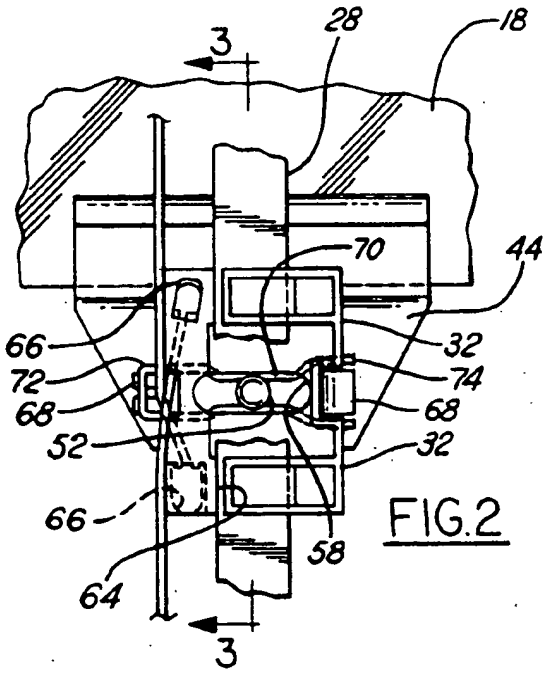


FIG. 2

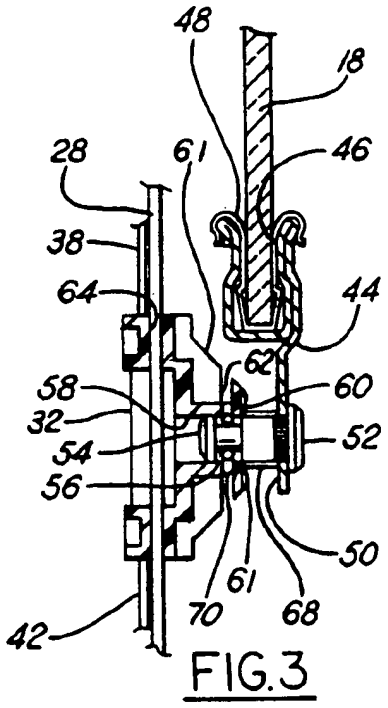


FIG. 3

SNAP-IN ATTACHMENT OF WINDOW PANE LIFT PLATE TO WINDOW REGULATOR

TECHNICAL FIELD

This invention is directed to motor vehicle window regulators and window mounting devices, and more specifically to an interface between the regulator and the window mounting devices.

BACKGROUND OF THE INVENTION

Window regulators are used to move glass window panes in motor vehicles between open and closed positions. The window pane moves within guide channels provided by the motor vehicle door structure. The window regulator moves the window pane up and down between an upward closed position and a downward open position with the guide channels in the door guiding the glass in its movement between the open and closed positions.

The window pane is commonly supported by a lift plate attached to the regulator by threaded fasteners. Assembly of the lift plate to the regulator is accomplished by providing the lift plate with a threaded stud which is passed through an aperture in the regulator, and subsequently threading a nut over the end of the stud. Because this assembly operation must often be executed in a hard to reach part of the door offering limited or no visibility, it requires a great deal of dexterity and care to install the nuts without dropping them. Dropped nuts remaining in the door may rattle in the completed vehicle.

A difficulty with installing the window regulator into a door is that the upward and downward path of the window pane must be parallel to the guide channels so that the window pane does not get stuck. One way to achieve this is to align guide tracks of the regulator parallel to the guide channels. Producing such alignment can be difficult, as it may require aligning the regulator with respect to the guide channels so that the window is provided with the necessary orientation to allow it to move freely in the guide channel when moved by the regulator.

It is desired to provide an attachment between the lift plate for the window pane and the window regulator requiring no loose parts such as nuts. It is also desired to provide such an attachment rendering the operation of the window relatively insensitive to the mounted position of the window regulator relative to the position of the guide channels.

SUMMARY OF THE INVENTION

A glider block assembly for a window regulator in a motor vehicle structure, adapted to receive a window lift plate having a pin with an engaging head spaced from a plate surface, is disclosed comprising a glider block and a spring clip. The glider block has an opening sized to receive the pin and a guide pin slot intersecting the opening. The spring clip is disposed in the spring clip slot and defines an entry gap smaller than the engaging head. The clip extends in part across the opening to provide an entry gap smaller than the engaging head. The spring clip expands to allow the engaging head to pass therethrough in response to pressure of the head thereagainst when the pin is received by the block. With the head moving past the clip, the clip snaps back behind the head, thereby retaining the plate to the block.

A snap-in attachment between a glider block and a lift plate for a window regulator in a motor vehicle structure with the lift plate adapted to receive a window pane is disclosed comprising the lift plate, the glider block and a spring clip. The lift plate has a pin with an engaging head spaced from a plate surface. The glider block defines an opening sized to receive the pin and defines a clip slot intersecting the opening. The spring clip is disposed in the clip slot and extends in part across the opening defines an entry gap smaller than the engaging head. The spring clip expands to allow the engaging head to pass therethrough in response to pressure of the head thereagainst and snaps back behind the head, thereby retaining the plate to the block.

A window system is disclosed for use in a motor vehicle structure providing first and second window guide channels enables an operator to move a window pane from a downward open position to an upward closed position and comprises a window regulator, a lift plate and a glider block. The window regulator is functionally disposed between the vehicle structure and the window pane and is responsive to operator input to raise and lower the window pane. The lift plate has a pin with an engaging head spaced from a plate surface and is fixed to a lower portion of the window pane. The glider block assembly is part of the regulator and defines an opening sized to receive the lift plate pin and has a spring clip intersecting the opening and defining an entry gap smaller than the engaging head. The spring clip expands to allow the engaging head to pass therethrough in response to pressure of the head thereagainst and snaps back behind the head, thereby retaining the plate to the block.

The snap-in attachment of the present invention employs a spring clip and engaging pin combination which eliminates the need for any loose fasteners such as bolts and nuts, thereby eliminating the possibility of loose fasteners falling into the structure and facilitating installation of the window. The present invention also provides a substantially horizontal slot that is part of the snap-in attachment providing relative float in the fore-aft direction between the window pane and the window regulator, allowing the guide channels to position the window pane in the fore-aft direction.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of an inner side of a vehicle door with a substantial portion of an inner panel broken out to expose a window regulator mechanism.

FIG. **2** shows a glider block and a lift plate viewed from the direction of arrows of FIG. **1**.

FIG. **3** is a partial sectional view of the glider block and lift plate of FIG. **2** in the direction of arrows **3**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A window system **10** shown in FIG. **1** is mounted in a vehicle door **12**. The door **12** has a fore guide channel **14** and an aft guide channel **16**. The fore and aft guide channels **14** and **16** are substantially C-shaped, are open toward each other, and are spaced to receive a window pane **18** for slidable disposition therein. The channels **14** and **16** extend to the window opening **20** in the door **12**.

The door **12** has an inner panel **22** and an outer panel **24**. A dual lift cable and drum type regulator **26**, as illustrated in FIG. **1**, is mounted to the inner panel **22**.

The regulator includes fore and aft tracks **28** and **30**. A glider block **32** is slidably disposed on each of the tracks **28**, **30**. A motor and drum assembly **34** is mounted to the inner panel **22**. Pulleys **36** are disposed at top and bottom ends of the racks **28** and **30**. A first cable **38** extends vertically

upward from the glider block **32** on the fore track **28**, wrapping around the upper pulley and traversing the door diagonally downward to the lower pulley of the aft track. The first cable then extends vertically upward to the glider block **32** on the aft track **30**. A second cable **40** extends vertically upward from the glider block **32** on the aft track **30**, around the pulley **36** at the top of the aft track **30**, and diagonally downward to the motor and drum assembly **34**. A third cable **42** extends from the motor and drum assembly **34** diagonally downward to the pulley **36** at the bottom of the fore track **28** and extends vertically upward to the glider block **32** on the fore track **28**. It should be appreciated that a hand crank mechanism can be substituted for the motor in the motor and drum assembly **34**.

The regulator **26** is characterized as a dual lift regulator because it supports the window pane **18** at both fore and aft locations with the lift plates **44** attached to the glider blocks **32**.

The lift plates **44** have a C-shaped opening **46** receiving the window pane **18**. An insulator **48** is disposed between the lift plate and the window pane **18**. The lift plate **44** defines a lift plate surface **50** disposed beneath the window pane **18**. A pin **52** is pressed into the lift plate **44** and projects out from the lift plate surface **50**. An engaging head **54** of the pin **52** is defined by a neck **56** in the pin, with the engaging head **54** being spaced from the plate surface **50**.

The glider block **32** is molded of plastic. The block **32** defines an elongated opening or slot **58** with a first width approximately equal to but slightly larger than the engaging head **54** of the pin **52**, and a substantially larger second width. The slot, or opening, **58** is maintained in a generally horizontal position. The block **32** has a tapered lead **60** surrounding the opening **58** to facilitate entry of the pin **52**. The tapered lead **60** is provided by a plurality of ribs **61** in the preferred embodiment. The ribs **61** are used to provide the tapered lead instead of a smooth forming so as to not to exceed a maximum section thickness permitted by plastic molding. A clip slot **62** intersecting the opening **58** is also defined by the guide block **32**. The clip slot **62** is preferably configured to be substantially parallel to the lift plate surface **50**. The block **32** also has a track slot **64** perpendicular to the elongated opening **58** accommodating its sliding disposition on either of the tracks **28**, **30**. The block **32** has pockets **66** for receiving cable ends. The glider block **32** has an engagement spring provided by a pair of horizontally extending, arcuately shaped leaf springs **68**. The leaf springs **68** are configured to contact the lift plate surface **50** to eliminate tilting of the block **32** relative to the lift plate **44**. One of the leaf springs **68** in the preferred embodiment is shown as being split into two parallel sections. Alternatively, the engagement spring can take forms other than the leaf springs **68**. For example, a foam rubber pad (not shown) can be positioned between the block **32** and the lift plate **44** to provide the desired bias therebetween.

A spring clip **70** is disposed in the clip slot **62**. The clip is disposed in part across the opening **58** and in a first position, shown in FIGS. **2** and **3**, and defines an entry gap smaller than the engaging head **54**. The spring clip **70** is expanded at a closed end **72** and an open end **74** to retain the clip **70** in the clip slot **62**. A combination of the glider block **32** and the spring clip **70** may be identified as a glider block assembly.

The present invention is advantageously employed in the following manner. Two lift plates **44** are bonded to a lower edge of the window pane **18** in predetermined locations for alignment with the tracks of the window regulator assembly **26**. The window regulator assembly **26** is placed in the door. The aft track **30** is fixed to the inner panel **22** by two pre-mounted screws, one at each of the top and the bottom of the tracks. This motor and drum assembly **54** is also mounted to the inner panel **22**. The assembled window pane **18** and lift plates **44** are inserted into the fore and aft guide channels **14**, **16** of the door **12**. The glass is positioned so that the pins **52** are aligned with the elongated openings **58** of the blocks **32**. The pins **52** are then forced into the openings **58**, being guided by the tapered lead **60**, and engaging the spring clip **70**. Forcing the engaging head **54** against the spring clip **70** causes the spring clip to expand, from the first position to a second position (not shown), allowing the engaging head **54** to pass therethrough with the spring clip **70** snapping back behind the head **54** and into the neck **56** of the pin **52**. This provides a positive lock between the lift plate **44** and the guide block **32**, thereby retaining the plate **44** to the block **32**. The leaf springs **68** engage the lift plate surface **50**, minimizing any tendency of the block **32** to rattle or otherwise move on the pin, as well as tending to minimize any twisting moments between the block **32** and the lift plate **44**.

The window pane **18** is raised to the closed position by energizing the motor to displace the guide blocks **32**, and hence, the window pane **18**. The fore track **28** is biased upward to seat the window pane **18** in an upper portion of the guide track (not shown) and is then fixed in place relative to the inner panel **22** with the upper and lower mounting screws. Only this vertical positioning of the fore track **28** is necessary to position both the window pane **18** and the regulator **26**, as the elongated openings **58** accommodate relative fore aft movement between the window pane **18** and the fore and aft tracks **28** and **30**. The slots **58** also allow the pins **52** to rotate freely therein, further facilitating installation of the regulator **26** and subsequent up and down movement of the window **18** without the regulator binding or sticking.

The attachment of the glass window pane **18** to the regulator **26** is thereby accomplished very quickly with substantially no chance of fasteners being dropped into the door where they could potentially cause a rattle. Additionally, this snap-in attachment saves a significant amount of time, and therefore labor cost, in the installation and assembly of a window pane and regulator in a vehicle door. Servicing of the door **12** is also benefitted by this invention. The window pane **18** is easily removed from the door **12** by first sliding out the spring clips **70** in a direction parallel to the slot **58**, and then lifting the window pane **18** out through the window opening **20**.

Other aspects, objects and advantages of this invention can be obtained from a study of the drawings, the disclosure and the appended claims.

We claim:

1. A glider block assembly for a motor vehicle window regulator, comprising:

a glider block defining an opening sized to receive a pin of a window lift plate extending from a surface of the plate and also defining a clip slot intersecting the opening; and

a spring clip disposed in the clip slot extending in part across the opening and defining in a first position an entry gap smaller than an engaging head of the pin and defining in a second position an expanded entry gap allowing the engaging head to pass therethrough in response to pressure of the head thereagainst when the pin is received by the block, snapping back behind the

head, and thereby retaining the plate to the block.

2. A glider block assembly as disclosed in claim 1, wherein the opening in the block for receiving the pin is elongated in a first direction to define the opening as a slot and the spring clip is also elongated and provides a substantially constant entry gap across the opening in the first position.

3. A glider block assembly as disclosed in claim 1, additionally comprising an engagement spring for placement between the block and the surface of the lift plate.

4. A glider block assembly as disclosed in claim 3, wherein the engagement spring is integrally formed with the block, extending therefrom.

5. A snap-in attachment between a glider block and a lift plate for a window regulator in a motor vehicle structure with the lift plate adapted to receive a window pane comprising:

the lift plate having a pin with an engaging head spaced from a plate surface;

a glider block defining an opening sized to receive the pin and defining a clip slot intersecting the opening; and

a spring clip in a first position providing an entry gap smaller than the engaging head and disposed in part across the opening wherein the spring clip expands to a second position to allow the engaging head to pass therethrough in response to pressure of the head thereagainst when the pin is received by the block, snapping back toward the first position from the second position behind the head, thereby retaining the plate to the block.

6. A snap-in attachment between a glider block and a lift plate as disclosed in claim 5, wherein the opening in the block for receiving the pin is elongated in a first direction to define a slot and the spring clip is also elongated and defines a substantially constant entry gap across the opening in the first position.

7. A snap-in attachment between a glider block and a lift plate as disclosed in claim 5, additionally comprising an engagement spring for placement between the block and the lift plate.

8. A snap-in attachment between a glider block and a lift plate as disclosed in claim 7, wherein the engagement spring is integrally formed with the block, extending therefrom.

9. A window system for use in a motor vehicle structure providing first and second window guide channels enabling an operator to move a window pane from a downward open position to an upward closed position, comprising:

a window regulator functionally disposed between the vehicle structure and a window pane and being responsive to operator input to raise and lower the window pane;

a lift plate having a pin with an engaging head spaced from a plate surface and fixed to a lower portion of the window pane; and

a glider block assembly of the regulator connected to the lift plate by the pin and defining an opening sized to receive the pin and having a spring clip providing an entry gap smaller than the engaging head and disposed in part across the opening wherein the spring clip expands to allow the engaging head to pass therethrough in response to pressure of the head against the clip when the pin is received by the block and snaps back behind the head, thereby retaining the plate to the block.

10. A window system as disclosed in claim 9, wherein the opening in the block for receiving the pin is elongated in a first direction to define a slot and the spring clip is also elongated and provides a substantially constant entry gap across the opening in the first position.

11. A window system as disclosed in claim 9, additionally comprising an engagement spring for placement between the block and the lift plate.

12. A window system assembly as disclosed in claim 11, wherein the engagement spring is integrally formed with the block, extending therefrom.

* * * * *